

Raman Lidar Temperature Profiler, Phase I

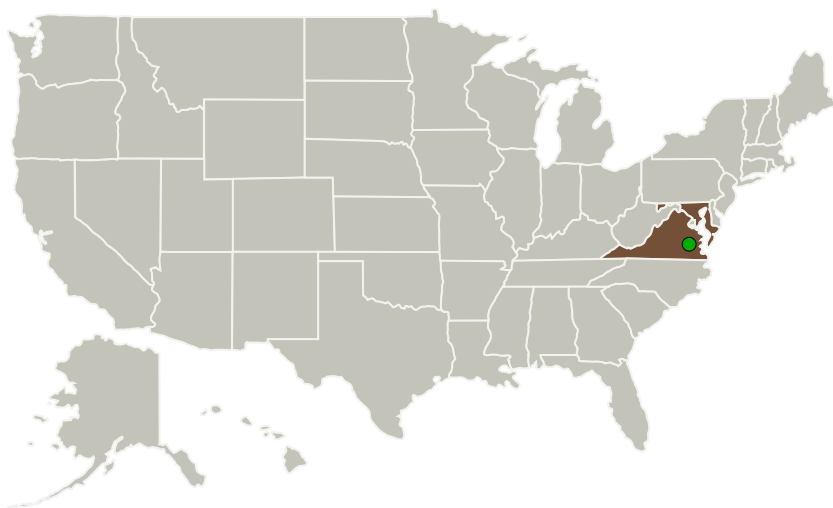
Completed Technology Project (2012 - 2012)



Project Introduction

Aircraft wake vortices is especially hazardous during the landing and taking-off phases of flight. It is essential to obtain an accurate atmospheric temperature profile in the lower troposphere for a better prediction and understanding of aircraft wake vortex. In this NASA SBIR project, we propose to build a lidar instrument that is capable of measuring both the daytime and nighttime atmospheric temperature profile in the lower troposphere. Atmospheric temperature measurement using Raman Lidar technique is well established and has been implemented by a lot of research groups. The major innovation of our approach is to use a low-power, high-repetitive-rate laser, instead of the high-power, low-repetitive-rate flash-lamp-pumped laser systems commonly used for such instruments. This will allow us to achieve the goals of building an eye-safe, compact, robust, reliable, relatively inexpensive and low maintenance instrument. The proposed lidar will be able to achieve 1K accuracy, good range resolution ($\sim 100\text{m}$) with a range up to 3 km at both daytime and nighttime with under 10 minutes of averaging. We will build a breadboard system for Phase I and perform a proof of concept temperature measurement. We will bring the development to preliminary design so that Phase II may begin with the final system design and begin construction as early as possible. Phase II will provide for delivery of a prototype and culminate in a series of validation field trials, comparing our measured profiles with other measurement techniques.

Primary U.S. Work Locations and Key Partners



Raman Lidar Temperature Profiler, Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

Raman Lidar Temperature Profiler, Phase I

Completed Technology Project (2012 - 2012)



Organizations Performing Work	Role	Type	Location
Masstech, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB), Minority-Owned Business	Columbia, Maryland
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Maryland	Virginia
----------	----------

Project Transitions

▶ **February 2012:** Project Start

✓ **August 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138445>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Masstech, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Guangkun Li

Co-Investigator:

Guangkun Li

Raman Lidar Temperature Profiler, Phase I

Completed Technology Project (2012 - 2012)



Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System